User's Manual

Version 1.1

Em104P-i6023

Intel Celeron ULV 400MHz board with VGA/LCD, TV-out, audio, dual Ethernet, CF socket, PC/104 and PC/104 Plus interface

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Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it :

1. Disconnect your Single Board Computer from the power source when you want to work on the inside
2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry
3. Use a grounded wrist strap when handling computer components.
4. Place components on a grounded antistatic pad or on the bag that came with the Single Board Computer, whenever components are separated from the system
5. The CPU need the Heat Sink on it.

Technical Support

If you have any technical difficulites, please consult the user's manual first at:

ftp://ftp.arbor.com.tw/pub/manual

Please do not hesitate to call or e-mail our customer service when you still can not find out the answer.

http://www.arbor.com.tw

E-mail:info@arbor.com.tw

Specifications

System

- **CPU** : Intel Ultra Low Voltage Embedded Celeron 400MHz to Pentium3 933MHz processor with FSB 100/133 MHz EBGA package.
- **Chipset** : VIA VT8606 TwisterT with Integrated Savage4 AGP 4X Graphics core and VT82C686B Super "South Bridge"
- **BIOS** : AWARD® Flash BIOS
- **L2 Cache** : Integrated on CPU (256 KB ~ 512 KB)
- **DRAM Memory** : Onboard SODIMM socket up to 512MB of SDRAM
- **Enhanced IDE with UltraDMA** : supports 2 port and up to 4 ATAPI devices, Ultra DMA transfer 33 / 66 and 100 MB/sec.
- **Real-time Clock** : built-in chipset with lithium battery backup(built on carrier board). CMOS data backup of BIOS setup and BIOS default.

Multiple I/O

- **Serial Ports** :
  Three RS-232C port (COM1, 3, 4)
  One RS-232C/422/485 port (COM2)
- **USB** : Two 2x5 Pin header supports up to 4 USB 1.1 devices
- **Ethernet** : Two Realtek 8100BL 10/100MBPS
- **Parallel Port** : 1 x parallel port supports SPP/EPP/ECP mode
- **Keyboard and Mouse** : One 1x6 pin wafer connector for PS/2 Keyboard and mouse
- **Audio Chipset**: VIA VT82C686B, AC97 2.0 compliant, Multistream Direct Sound and Direct Sound 3D acceleration.

Display Controller

- **Chipset** : 4x AGP S3 Savage4 3D and S3 Savage 2000 2D engines integrated in VT8606 supports up to 32MB of Shared Memory
- **Display Type** : Flat Panel and CRT displays up to 1280x1024 @ 32 bpp
  - Lcd interface : Flat Panel 36-bit TFT/DSTN interface
  - LVDS interface(PBE-1000) : Scalable Bandwidth is ranging from 25MHz~112MHz(VGA~SXGA) 18/36-bit one/two channel LVDS interface
  - TV-Out : Support NTSC,PAL NTSC-EIA(Japan) formats . Support 640x480 resolutions
- **Resolution**: Single Channel of LVDS / 36-bit of TTL and 12-bit of TMDS; all resolutions are supported up to 1280x1024.

Mechancial

- **Dimension (L x W): 114 x 95 mm (4.5" x 3.7")**
- **Operative Humidity: 5% ~ 95% (non condensing)**
- **Operating Temperature** : 0 to 60˚C (32 to 140˚F)

Packing list

Before you begin installing your single board computer, please make sure that the following materials have been shipped:

> 1 x Em104P-i6023

> 1 x Quick Installation Guide

> 1 x CD-ROM (for driver used)

> 1 x Warranty Card

Packing list

Before you begin installing your single board computer, please make sure that the following materials have been shipped:

> 1 x EmETX-i602 EXT Embedded Intel Celeron(or PIII Tulatin) SBC

> 1 x Quick Installation Guide

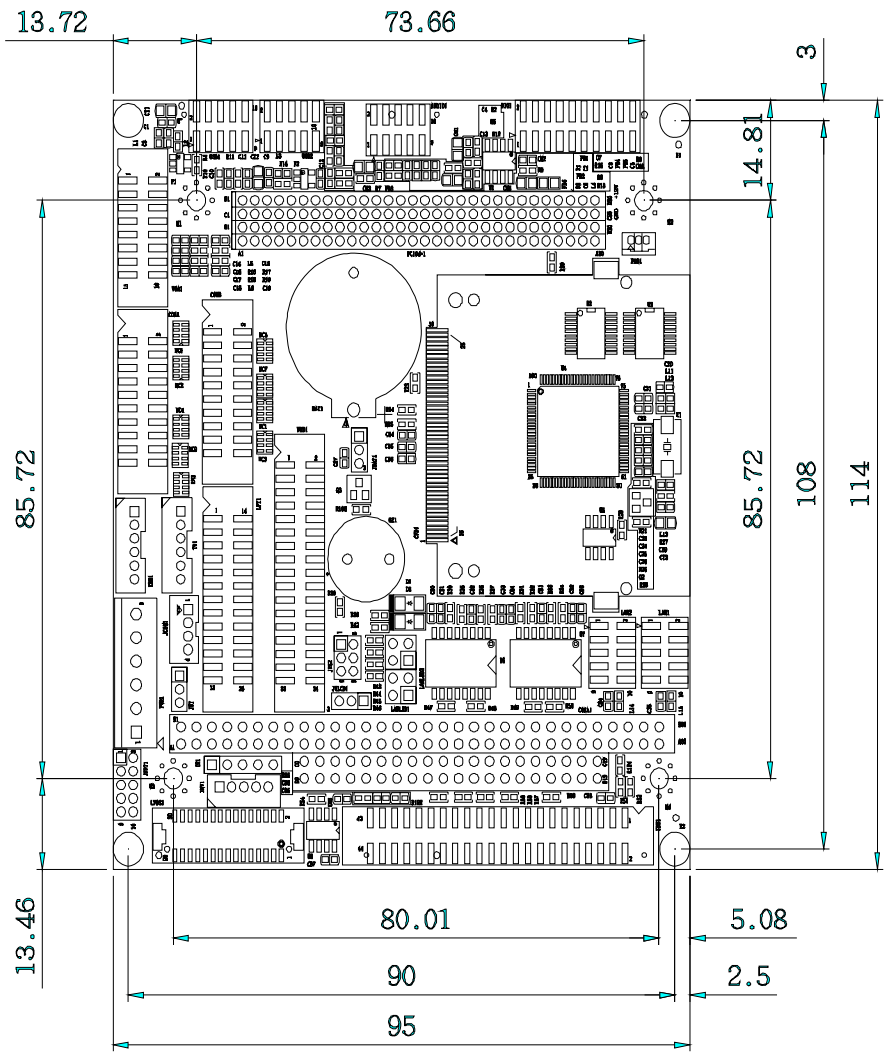
> 1 x CD-ROM (for driver used)

> 1 x Warranty Card

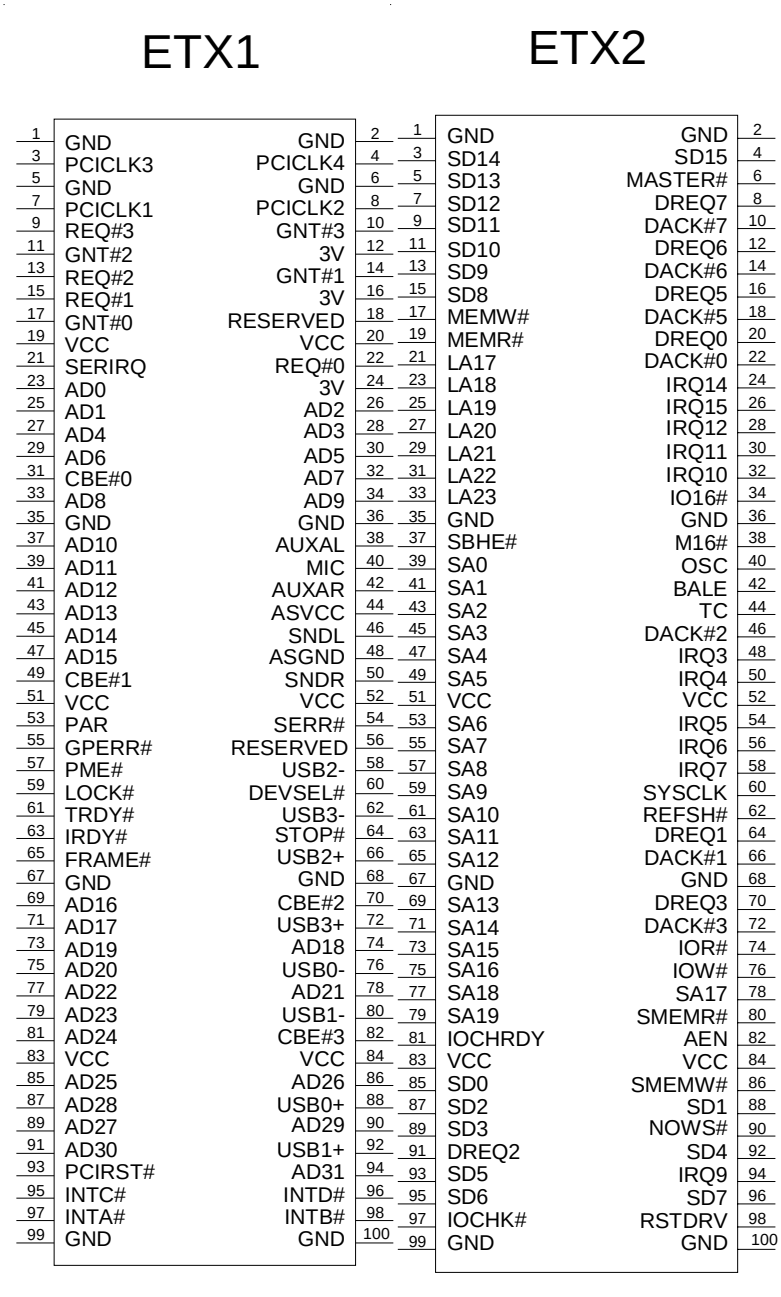
Ordering Codes

EmETX-i6023/C400 Intel Celeron ULV 400MHz board with VGA/LCD, TV-out, audio, dual Ethernet, CF socket, PC/104 and PC/104 Plus interface

Board Dimension



ETX Connector



ETX Connector

ETX3

1	GND	GND	2
3	R	B	4
5	HSY	G	6
7	VSY	DDCK	8
9	DETECT#/N.C	DDDA	10
11	TX2CLK#	TX2D3#	12
13	TX2CLK+	TX2D3+	14
15	GND	GND	16
17	TX2D1+	TX2D2+	18
19	TX2D1#	TX2D2#	20
21	GND	GND	22
23	TX1D3#	TX2D0+	24
25	TX1D3+	TX2D0#	26
27	GND	GND	28
29	TX1D2#	TX1CLK+	30
31	TX1D2+	TX1CLK#	32
33	GND	GND	34
35	TX1D0#	TX1D1+	36
37	TX1D0+	TX1D1#	38
39	VCC	VCC	40
41	N.C	N.C	42
43	N.C	BLON#	44
45	BIASON	DIGON	46
47	COMP	Y	48
49	SYNC	C	50
51	N.C	N.C	52
53	VCC	GND	54
55	STB#	AFD#	56
57	N.C	PD7	58
59	IRRX	ERR#	60
61	IRTX	PD6	62
63	RXD2	INIT#	64
65	GND	GND	66
67	RTS#2	PD5	68
69	DTR#2	SLIN#	70
71	DCD#2	PD4	72
73	DSR#2	PD3	74
75	CTS#2	PD2	76
77	TXD#2	PD1	78
79	RI2#	PD0	80
81	VCC	VCC	82
83	RXD1	ACK#	84
85	RTS#1	BUSY#	86
87	DTR#1	PE	88
89	DCD#1	SLCT#	90
91	DSR#1	MSCLK	92
93	CTS#1	MSDAT	94
95	TXD#1	KBCLK	96
97	RI1#	KBDAT	98
99	GND	GND	100

ETX4

1	GND	GND	2
3	5V_SB	PWGIN	4
5	PS_ON	SPEAKER	6
7	PWRBTN#	BATT	8
9	N.C	LILED	10
11	WDTOUT	ACTLED	12
13	ROMKBCS#	SPEEDLED	14
15	N.C	12CLK	16
17	VCC	VCC	18
19	OVCR#	GPCS#	20
21	EXTSMI#	12DAT	22
23	SMBCLK	SMBDAT	24
25	SIDE_CS3#	CPU_FAN	26
27	SIDE_CS1#	DASP#	28
29	SIDE_A2	PIDE_CS3#	30
31	SIDE_A0	PIDE_CS1#	32
33	GND	GND	34
35	PD33/66SEL	PIDE_A2	36
37	SIDE_A1	PIDE_A0	38
39	SIDE_INTRQ	PIDE_A1	40
41	SD33/66SEL	N.C	42
43	SIDE_AK#	PIDE_INTRQ	44
45	SIDE_RDY	PIDE_AK#	46
47	SIDE_IOR#	PIDE_RDY	48
49	VCC	VCC	50
51	SIDE_IOW#	PIDE_IOR#	52
53	SIDE_DRQ	PIDE_IOW#	54
55	SIDE_D15	PIDE_DRQ	56
57	SIDE_D0	PIDE_D15	58
59	SIDE_D14	PIDE_D0	60
61	SIDE_D1	PIDE_D14	62
63	SIDE_D13	PIDE_D1	64
65	GND	GND	66
67	SIDE_D2	PIDE_D13	68
69	SIDE_12	PIDE_D2	70
71	SIDE_D3	PIDE_D12	72
73	SIDE_D11	PIDE_D3	74
75	SIDE_D4	PIDE_D11	76
77	SIDE_D10	PIDE_D4	78
79	SIDE_D5	PIDE_D10	80
81	VCC	VCC	82
83	SIDE_D9	PIDE_D5	84
85	SIDE_D6	PIDE_D9	86
87	SIDE_D8	PIDE_D6	88
89	RING IN	WOL	90
91	RXD#	PIDE_D8	92
93	RXD	SIDE_D7	94
95	TXD#	PIDE_D7	96
97	TXD	HDRST#	98
99	GND	GND	100

Jumper/Connector in Top Side

Connectors

Lable	Function	Page
LCD1	LCD TTL Connector 1	9
LCD2	LCD TTL Connector 2	9
ETX1	PCI Bus, USB, Audio	10
ETX2	ISA Bus	10
ETX3	VGA,LCD,Video,COM1,COM2,LPT,IrDA,M/K	11
ETX4	IDE1,IDE2,Ethernet,Miscellaneous	11

Flat Panel VGA

LCD1

Type : Onboard 40-pin Box Header (Hirose DF-40DS-1.25C)

Pin	Description	Pin	Description
1	VCC5V	2	VCC5V
3	GND	4	GND
5	VCC3V	6	VCC3V
7	NC	8	GND
9	FPD0	10	FPD1
11	FPD2	12	FPD3
13	FPD4	14	FPD5
15	FPD6	16	FPD7
17	FPD8	18	FPD9
19	FPD10	20	FPD11
21	FPD12	22	FPD13
23	FPD14	24	FPD15
25	FPD16	26	FPD17
27	FPD18	28	FPD19
29	FPD20	30	FPD21
31	FPD22	32	FPD23
33	GND	34	GND
35	SHFCLK	36	HSYNC
37	M(DE)	38	VSYNC
39	ENABLK	40	ENAVEE

LCD2

Type : Onboard 20-pin Box Header (Hirose DF-20DS-1.25C)

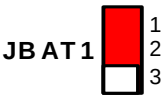
Pin	Description	Pin	Description
1	GND	2	GND
3	FPD24	4	FPD25
5	FPD26	6	FPD27
7	FPD28	8	FPD29
9	FPD30	10	FPD31
11	FPD32	12	FPD33
13	FPD34	14	FPD35
15	GND	16	GND
17	NC	18	NC
19	NC	20	NC

Jumper/Connector in Back Side

Label	Function
INV1	LCD Inverter connector
LVDS1	LVDS Connector (30 pin)
TV1	TV-Out
PWR1	Power terminator/6P Power Connector
IDE1	Primary IDE Connector
CFD1	Compact Flash socket (shared with 2nd IDE Master)
VGA1	VGA Display Connector
IR1	Infrared (IR) Connector
USB1	USB 0/1 Connector
USB2	USB 2/3 Connector
COMA	COM1 / COM2
COMB	COM3 / COM4
LPT1	Parallel Port
LAN1	10/100 Base-T Ethernet Connector from ETX core module
LAN2	10/100 Base-T Ethernet Connector from carrier board
LANLED1	LAN LINK / ACTIVE LED status
LANLED2	LAN LINK / ACTIVE LED status
AUDIO1	Audio Connector
FDD1	Floppy Disk Drive Connector
KBM1	PS/2 Keyboard & Mouse
FAN1	+5V DC power source for FAN
JFRT1	Switches & Indicators
DIO1	Digital Input/Output
PC104	PC104 ISA Connector
PC104+	PC104+ PCI Connector
JCOM1	RS-422/485 Connector

CMOS Jumper Settings

CMOS Setup (JBAT1)



Type : JBAT1: onboard 3-pin header

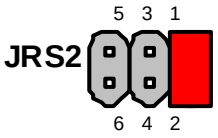
CMOS Setup (JBAT1)	JBAT1	
Keep CMOS	1-2	ON
Clear CMOS	2-3	ON

default setting : Keep CMOS

Serial Port Selection (RS232C/422/485)

RS-232C/422/485 Mode on COM2 (JRS2)

The onboard COM2 port can be configured to operate in RS-232C mode or in different RS-422/485 modes.



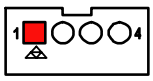
Mode Selection	1-2	3-4	5-6
RS-232C	ON	OFF	OFF
RS-422	OFF	ON	OFF
RS-485	OFF	OFF	ON

Default setting RS-232

RS422/485 Connector

Connector : JCOM1

Type : Onboard 4-pin boxheader



JCOM1

Pin	Description	Pin	Description
1	RS485 RTX+/RS422 TX+	2	RS485 RTX-/RS422 TX-
3	RS422 RX+	4	RS422 RX-

Watchdog Timer

Watchdog Output (JWT)

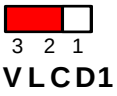
Mode Setting

Watchdog Mode	JWT
Enabled for Active NMI(I/O Channel Check)	1-2
Enabled for System Reset	2-3
Disable Watchdog Timer	None

default setting Enabled

LVDS Voltage Seletion

LVDS Operation (JVLCD1)
Type : onboard 3-pin dip switch



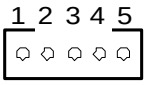
LVDS VOLTAGE SELECT	JVLCD1
5V	1-2
3.3V	2-3

default setting 3.3V

LCD Inverter Connector

Connector : INV1

Type : Onboard 5-pin mini boxheader

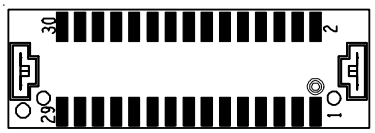


Pin	Description	Pin	Description
1	+12 V	2	GND
3	BLON	4	NA
5	GND		

LVDS LCD Connector

Connector : LVDS1

Type : onboard DF-13-30P-1.25V



LVDS1

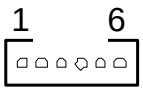
1	VDD	2	VDD
3	TX1CLK+	4	TX2CLK+
5	TX1CLK-	6	TX2CLK-
7	GND	8	GND
9	TX1D0+	10	TX2D0+
11	TX1D0-	12	TX2D0-
13	GND	14	GND
15	TX1D1+	16	TX2D1+
17	TX1D1-	18	TX2D1-
19	GND	20	GND
21	TX1D2+	22	TX2D2+
23	TX1D2-	24	TX2D2-
25	GND	26	GND
27	TX1D3+	28	TX2D3+
29	TX1D3-	30	TX2D3-

VDD could be selected by JVLCD1 +5V or +3.3V

TV-out Connector

Connector : TV1 (Function not available in Em104P-i7013)

Type: Onboard 6-pin mini boxheader

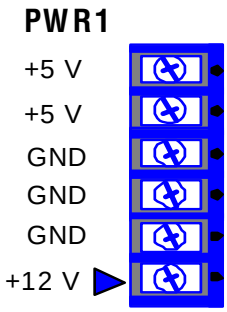


PIN	Description
1	TV_COMP
2	GND
3	TV_Y
4	GND
5	TV_C
6	GND

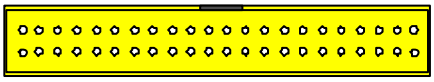
Power Connector

Connector : **PWR1**
Type : onboard 6-pin Terminator

Pin	Description
1	+12V
2	GND
3	GND
4	GND
5	+5V
6	+5V



Enhanced IDE Connector



Connector : **IDE1**
Type : One onboard 44-pin box headers, primary IDE

Pin	Description	Pin	Description
1	#RESET	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	NC
21	REQ	22	GND
23	#IOW	24	GND
25	#IOR	26	GND
27	#IORDY	28	IDESEL
29	#DACK	30	GND
31	IRQ	32	NC (-IOCS16)
33	ADDR1	34	CBLID
35	ADDR0	36	ADDR2
37	#CS1	38	#CS3(#HD SELECT1)
39	#ACT	40	GND
41	Vcc	42	Vcc
43	GND	44	NC

Compact Flash Connector

Connector : **CFD1**
Type : 50-pin compact flash type I/II (Share 2nd IDE Master)

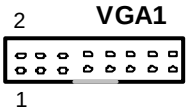
Pin	Description	Pin	Description	Pin	Description
1	GND	18	ADDR2	35	IO WRITE
2	DATA3	19	ADDR1	36	+5V
3	DATA4	20	ADDR0	37	IRQ15
4	DATA5	21	DATA0	38	+5V
5	DATA6	22	DATA1	39	CSEL
6	DATA7	23	DATA2	40	N/C
7	CS#1	24	N/C (-IOCS16)	41	IDE RESET
8	GND	25	GND	42	IO READY
9	GND	26	GND	43	N/C
10	GND	27	DATA11	44	+5V
11	GND	28	DATA12	45	DASP
12	GND	29	DATA13	46	DIAG
13	+5V	30	DATA14	47	DATA8
14	GND	31	DATA15	48	DATA9
15	GND	32	CS#3	49	DATA10
16	GND	33	GND	50	GND
17	GND	34	IO READ		

Note: CFD1 does not support hot swap

VGA Connector

Connector : VGA1

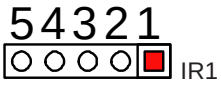
Type: Onboard 16-pin mini boxheader



Pin	Description	Pin	Description	Pin	Description
1	RED	6	GND	11	NC
2	GREEN	7	GND	12	VDDAT
3	BLUE	8	GND	13	HSYNC
4	NC	9	NC	14	VSYNC
5	GND	10	GND	15	VDCLK
16	NC				

IrDA Connector

Connector : **IR1**
Type : Onboard 5-pin header

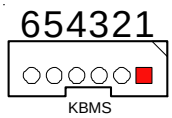


Pin	Signal	Pin	Signal
1	+5V	2	NC
3	IRRX	4	GND
5	IRTX		

Keyboard & PS/2 Mouse

Connector : **KBMS**

Type : onboard wafer 1x6-pin



Pin	Description	Pin	Description
1	KB_DATA	2	GND
3	MS_DATA	4	KB_CLK
5	+5V	6	MS_CLK

COMA & COMB Connector

Connector : **COMA RS232 Serial Port Connector (COM1,COM2)**
Type : onboard 2x10-pin box header

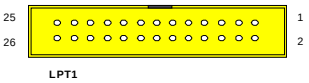
Pin	Description	Pin	Description
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI	10	N/C
11	DCD2	12	RXD2
13	TXD2	14	DTR2
15	GND	16	DSR2
17	RTS2	18	CTS2
19	RI	20	N/C

Connector : **COMB RS232 Serial Port Connector (COM3,COM4)**
Type : onboard 2x10-pin box header

Pin	Description	Pin	Description
1	DCD3	2	RXD3
3	TXD3	4	DTR3
5	GND	6	DSR3
7	RTS3	8	CTS3
9	RI	10	N/C
11	DCD4	12	RXD4
13	TXD4	14	DTR4
15	GND	16	DSR4
17	RTS4	18	CTS4
19	RI4	20	N/C

Parallel Port

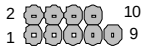
Connector : **LPT1**
Type : onboard 26-pin box header



Pin	Description	Pin	Description
1	#STROBE	14	#AUTO FEED
2	DATA0	15	#ERROR
3	DATA1	16	#INITIALIZE
4	DATA2	17	#SELECT INPUT
5	DATA3	18	GND
6	DATA4	19	GND
7	DATA5	20	GND
8	DATA6	21	GND
9	DATA7	22	GND
10	#ACKNOWLEDGE	23	GND
11	BUSY	24	GND
12	PAPER EMPTY	25	GND
13	SELECT	26	GND

USB Connector

Connector: **USB1, USB2**
Type:onboard Two 10-pin headers for four USB ports

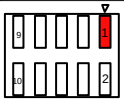


USB1

Pin	Description	Pin	Description
1	5V	2	5V
3	USBD0-	4	USBD1-
5	USBD0+	6	USBD1+
7	GND	8	GND
9	GND	10	Key

Audio Interface

Connector : **Audio1**
Type : Onboard 10-pin box header



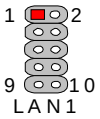
Audio1

Pin	Description	Pin	Description
1	LINE IN LEFT	2	LINE IN RIGHT
3	GND	4	GND
5	MIC	6	NC
7	GND	8	GND
9	SPEAKER LEFT	10	SPEAKER RIGHT

Fast Ethernet Connectors

LAN Port (10/100Mbps)

Connector : **LAN1 & LAN2**
Type : Two 2x5 pin header for LAN ports



LAN1

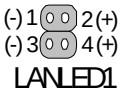
Pin	1	2	3	4	5
Desciption	TX+	TX-	RX+	NC	NC
Pin	6	7	8	9	10
Description	RX-	NC	NC	NC	Key

LAN LED Indicator

LAN LED Indicator on RJ-45 connector

Connector : LANLED1 & LANLED2

TYPE : Onborad 4-pin connector

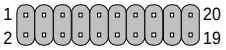


LANLED1

Pin	Description
1-2	Activity
3-4	Link

8-bit Digital I/O

Connector : **DIO1**
Type : Onboard 20-pin header



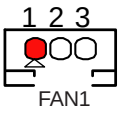
Pin	Description	Pin	Description
1	DO0	2	DO1
3	DO2	4	DO3
5	DO4	6	DO5
7	DO6	8	DO7
9	GND	10	GND
11	DI0	12	DI1
13	DI2	14	DI3
15	DI4	16	DI5
17	DI6	18	DI7
19	+5V	20	+12V

Output I/O Address :208H

Input I/O Address:200H

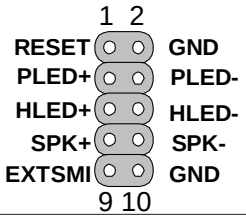
System Fan Connector

Connector : **FAN1**
Type : onboard 3-pin header



Pin	Description
1	N/A
2	+5V
3	GND

Switches and Indicators



Connector : **JFRT1**
Type : onboard 10-pin header

Pin	Description
1-2	Reset
3-4	Power LED
5-6	HDD LED
7-8	Exteranal speaker
9-10	External SMI